

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
29 December 2004 (29.12.2004)

PCT

(10) International Publication Number  
**WO 2004/114005 A1**

(51) International Patent Classification<sup>7</sup>: G02F 1/1337, C09K 19/02

(SE). HELGEE, Bertil [SE/SE]; Fullriggaregatan 23, S-426 74 Västra Frölunda (SE). FELIX, Johan [SE/SE]; Hantverkaregatan 1, S-411 29 Göteborg (SE).

(21) International Application Number:  
PCT/SE2004/000880

(74) Agent: AWAPATENT AB; P.O. Box 11394, S-404 28 Stockholm (SE).

(22) International Filing Date: 7 June 2004 (07.06.2004)

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0301810-8 23 June 2003 (23.06.2003) SE  
0303041-8 18 November 2003 (18.11.2003) SE  
SE2004/000300 4 March 2004 (04.03.2004) SE

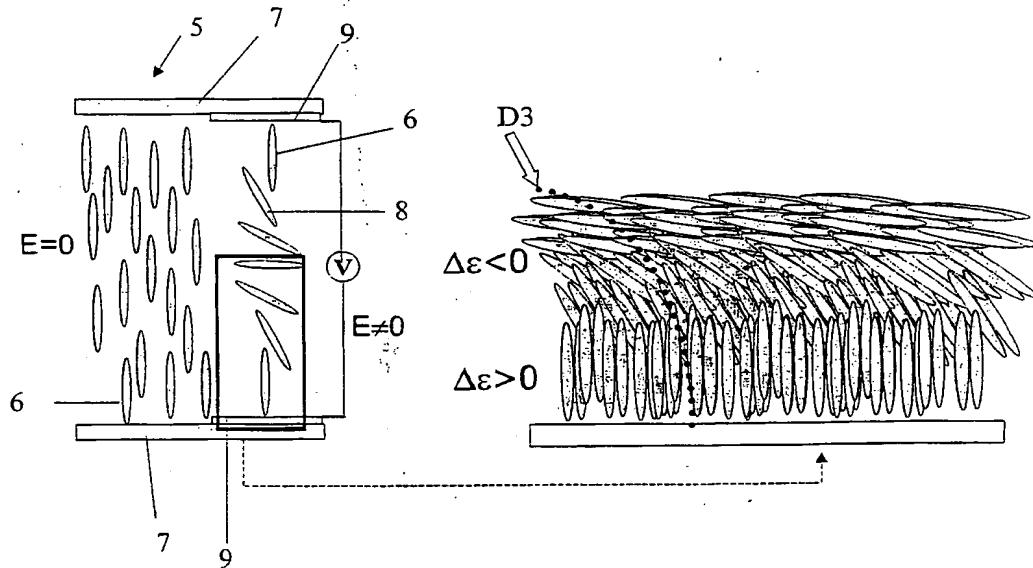
(71) Applicant (for all designated States except US): ECSI-BEO AB; Hugo Grauers gata 3, S-412 96 Göteborg (SE).

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,

(72) Inventors; and  
(75) Inventors/Applicants (for US only): KOMITOV, Lachezar [SE/SE]; Landalabergen 26, S-411 29 Göteborg

[Continued on next page]

(54) Title: A LIQUID CRYSTAL DEVICE AND A METHOD FOR MANUFACTURING THEREOF



(57) Abstract: The invention relates to a liquid crystal device comprising a liquid crystal bulk layer and a surface-director alignment layer comprising side-chains arranged to interact with the bulk layer, wherein the orientation of the bulk layer molecules and the orientation of said side-chains each is directly controllable by an electric field via dielectric coupling, thus resulting in a decreased total time period (rise and decay times) needed to switch and relax the liquid crystal bulk molecules in response to an applied external field. The invention also relates to a method for manufacturing a liquid crystal device and a method of controlling a liquid crystal bulk layer.

**WO 2004/114005 A1**



SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA,*

*SD, SL, SZ, TZ, UG, ZM, ZW). Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM). European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

- *of inventorship (Rule 4.17(iv)) for US only*

**Published:**

- *with international search report*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*